Remarks

The applicant has amended claims 1 and 4 and added new claims 9-18. The applicant has also amended the application to address minor informalities in the specification. None of the amendments introduce any new matter.

Early favorable consideration is respectfully requested. If the Examiner believes that a telephone conference will advance prosecution of this application, such a conference is highly encouraged at the convenience of the Examiner.

Please charge any additional fees or credit any overpayments as a result of the filing of this paper to our Deposit Account No. 02-3978 -- a duplicate of this paper is enclosed for that purpose.

Respectfully submitted,

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Attachment

VERSION WITH MARKINGS TO SHOW CHANGES MADE

In The Specification:

Page 1, Line 20

The present invention overcomes the problems encountered in the prior art by providing a method of producing a composite panel that comprises manufacturing a skin in a [vacuum-foam] vacuum-forming mold. The skin is then transferred to a RIM (Reaction Injection Molding) mold. Next, natural fibers and an isocyanate and a resin mixture are placed on the skin. The isocyanate and resin mixture, the natural fiber, and the skin are then polymerized into a composite panel.

Page 2, Line 9

FIGURE 3 is a perspective view of a formed part;

Page 2, Line 10

FIGURE [3] 4 is a perspective view of the formed part being trimmed utilizing a water jet trimming operation; and

FIGURE [4] 5 is a perspective view of [the] a manufacturing process showing application of [the] an isocyanate and resin mixture [and the coverstock] onto the formed part.

Page 2, Line 15

A finished vehicle door panel 10 is illustrated in Figure 1. While the [invention] application refers to and illustrates a door panel, the present invention is applicable to other vehicular panels and also non-automotive applications.

Page 3, Line 1

Prior to vacuum-forming, the blank 12 is softened using heating elements 11 which may be infrared heat lamps, exhaust ports for a heated gas, or other heating methods. The blank 12 is placed on a vacuum-forming die 14 having a cavity 16 essentially in the shape of the final desired part. The [cavity 16] die 14 comprises a plurality of holes 18 used to draw the blank 12 into the cavity 16 so that the blank take its final form 20. Additionally, air pressure can be used to help form the part. A male die portion (not shown) can also be used to help form the part by pressing the blank into the cavity 16.

When the formed part or skin 20 has sufficiently cooled, it is removed from the vacuum-forming die 14. This step can be either done manually or using automated techniques such as robotics. At this point, excess material 13 can be trimmed from the formed part 20 using a trimming operation such as a water jet cutter as shown in Figure [3] 4. The water jet cutter uses water pressurized up to 60,000 psi and forced through a small opening to trim the excess material [that creates] to form the final desired part shape. Abrasive material, such as garnet, may be added to the pressurized water to better cut composite materials.

Referring now to Figure [4] 5, the formed part 20 is placed in a RIM (Reaction Injection Molding) mold cavity 30 having a cavity (not shown) essentially in the shape of the final part. The mold 30 may be heated to approximately 140-180 degrees Fahrenheit. Next, natural fibers 22 of, for example, hemp, kenaf, sisal, flax, or jute may be placed on the cut skin 20. As discussed below, the fibers may be applied simultaneously with the resin. These natural fibers 22 replace fiber glass and other fibers used in the prior art to provide recyclability. Figure [4] 5 illustrates the natural fibers 22 placed on an interior, concave surface. The natural fibers 22 may be provided as a fiber mat or as rovings. Further, the natural fibers 22 can be provided in roll or sheet form.

Page 3, Line 29 through Page 4, Line 6

Isocyanate 32 and resin 34 are mixed in an impingement head 35 and the resulting isocyanate and resin mixture 36 is either applied into the gap created between the formed part 20 and the male mold portion 50 through a mixhead via the open pour process simultaneously with chopped natural fibers 22 or onto the natural fibers 22 and [form] formed part 20. Preferably, the isocyanate is polymeric isocyanate. More preferably, the isocyanate is a polymeric isocyanate having 30-34% free NCO. The resin mixture is preferably a rigid type formulation. However, one skilled in the art could substitute other isocyanate and resin mixtures.

Page 4, Line 7

Attachments, such as nylon hooks (not shown), may be put into the isocyanate and resin mixture 36 or attached to the formed part 20 to provide secure attachments for the part. The isocyanate and resin mixture 36, the natural fiber 22, and the skin [22] 20 are then polymerized [in to] into a composite vehicle panel.

In The Claims:

1. (Amended) A method of producing composite vehicle door panels comprising:

manufacturing a skin in a vacuum-forming mold;

transferring the skin to a RIM mold;

applying natural [fiber] fibers and an isocyanate and resin mixture onto the skin;

polymerizing the isocyanate and resin mixture, the natural [fiber] fibers, and [a] the skin into a composite vehicle door panel.

4. (Amended) The method of claim 1 further comprising the step of trimming the skin after the isocyanate and resin mixture, natural [fiber] fibers, and the skin have polymerized.

In The Abstract:

A method of producing composite vehicle door panels. A skin is manufactured in a vacuum-forming mold. The skin is then transferred to a RIM mold. Next, natural fibers and an isocyanate and a resin mixture are placed on the skin. The isocyanate and resin mixture, the natural [fiber] fibers, and the skin are then polymerized into a composite panel.